

**THE DURBAN AUTO CLUSTER:
GLOBAL COMPETITION, COLLECTIVE EFFICIENCY,
AND LOCAL DEVELOPMENT ***

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INTRODUCTION

Our tale begins as follows: *Once upon a time, in far-away lands where the lion and the bushbuck meet, there was a bunch of automotive component suppliers. A high wall fenced off their territory against foreign marauders, and the bunch gaily went about their business of manufacturing substandard parts for vehicles produced in such small batches that consumers in this strange nation paid among the highest prices in the world for their cars. One day our suppliers woke up and to their astonishment realised that the wall was gone. Worse, before they could finish breakfast, heavily ekwipped suppliers and kar assemblers schpeaking with strange akzents had taken over half zee nation's territory. Word on the street was that fifth columns in the country had helped the outside forces prepare their assault. The future looked dim for our terrified and demoralized bunch! And the end goes like this: ... and thus, our bunch lived happily ever after, sort of.*

The tale's missing mid-section requires some elaboration. Section 2 offers a brief primer on the anatomy, internal dynamics, and evolution of clusters. Section 3 describes the historical evolution of the Durban Automotive Cluster (DAC) in the context of the impact of aggressive trade liberalisation and expanding global automotive supply chains on the South African automobile industry. Section 4 is the analytical core of the chapter. It first presents our data and lays out our methodology. It then discusses the performance of the cluster over time, benchmarked against international competitors. Next, it develops a composite cooperation index to measure joint action, a key hypothesised determinant of cluster performance. Finally, it verifies the reasons behind the growth of the cluster through a survey of its members. Section 5 concludes with some remarks about the significance of our tale for both understanding and influencing cluster development in an advanced latecomer economy.

A BRIEF PRIMER ON THE ANATOMY, INTERNAL DYNAMICS, AND EVOLUTION OF CLUSTERS

How do we know a cluster when we see one? Invariably the answer to this question depends on the definition of the phenomenon. If any set of industries where buyers and suppliers interact or where participant firms share common technologies, buyers, or distribution channels, or where they

make use of the same labour pool, constitutes a cluster, the world must be full of them.¹ If we impose the additional condition for these firms to be in the same location, the world-wide cluster head count is clearly lower.² However, what has given rise to cluster analysis, both historically and in the present age, is not so much the existence of inter-firm relationships or geographical concentration per se but rather the effects on economic performance these two characteristics allegedly give rise to. In short, a firm that can count on the ready availability of a pool of skilled labour and intermediate goods suppliers and that operates in an environment rife with new ideas – about products, technologies, or organisation – is likely to be more efficient than a firm located all by itself on the moon. This is true even in a globalised economy because much technology is so complex, specific, and cumulative in its development that it defies codification and transmission.³ Thus, when aggregating across all participant firms, the presence of externalities sees to it that a cluster is more than the sum of its parts or, more precisely, its static and dynamic efficiency is superior to what its participant firms would achieve outside the cluster context.

Another reason commonly given for superior cluster performance is that it makes sense for firms in a cluster to cooperate with and to compete against each other more so than if they were dispersed. For example, close proximity allows the setting up of common training schemes. Conversely, the presence of local competitors spurs greater competition because compared to far-away producers it manifests a very visible threat.⁴ In knowledge-intensive industries, much is made of the import of inter-firm learning for technological upgrading and innovation. Work commissioned by the OECD suggests that clusters have the potential to remove the imperfections with respect to the production and use of knowledge inherent in international production networks or national innovation systems, thanks to the strong interdependencies between firms they create and exploit.⁵

Similarly, in developing countries where the prevalence of small manufacturing firms often constitutes a hindrance to exploiting market opportunities, achieving economies of scale in input purchases, and internalising many of the functions that drive firm dynamism, networking – which is easier in clusters – can help firms enhance their competitiveness.⁶ For example, the extent, depth, and effectiveness of the adoption of international best practices explain a good deal about why some firms manage to rise to the challenge of the southward expansion of global supply chains that require just-in-time (JIT) production and total quality

management (TQM), while others do not. Next to the impact of relative integration into supply chains, it is again the interaction between the capabilities of firms, in addition to their response to competitive opportunities, that influences their growth. In short, for a number of reasons industrial reorganisation of developing-country firms may be more feasible from within a cluster.⁷

In practical terms a firm may be able to exploit spillovers in joint ventures or from subsidiaries of multinational firms (MNEs) with which they are not co-located. Hence agglomeration is not a necessary condition for externalities to materialise. An interesting question is what happens when the strategies of MNEs and local firms intersect inside a cluster that yields outcomes beyond those traditionally associated with host-country effects of foreign direct investment (FDI).⁸ This is an emerging field of enquiry that warrants further research.⁹ On balance, theory and empirical evidence so far suggest that it is very difficult to capture knowledge from an MNE without having to pay for it, and thus easier to assimilate and adapt information from firms in geographical proximity with which one is in everyday contact.¹⁰ Herein lies the attraction of the cluster concept both for developed and developing countries.

But it is sometimes forgotten that agglomeration by itself is also not a sufficient condition to stimulate externalities. Like two grumpy old men sitting on a park bench without talking to each other, a cluster without externalities is at best an opportunity forgone, without the trappings of an interesting story. What would be an attractive story is seeing the two gentlemen all of a sudden engaged in a friendly and animated conversation, especially if one were able to understand what made them change their ways.

In more formal language, the reduction of cluster dynamics to externalities – which by definition are involuntary and incidental – flies in the face of empirical evidence of what makes clusters tick the world over. The missing element is consciously pursued joint action mainly by firms, on occasion assisted by public-sector organisations and dedicated service providers. In other words, successful clusters develop partly because of human agency behind a wide range of forms of business cooperation. Put simply, externalities *and* joint action are the source of competitive advantage; Schmitz has termed this collective efficiency.¹¹

The collective-efficiency framework helps explain the evolution of clusters. It makes sense to view cluster strength as the ability to respond to (adverse) changes in the environment, rather than as just a static attribute of however defined success. Clusters may have life cycles that are related to but not synonymous with the cycle of their key technologies. For example, congestion may impede further growth of a cluster literally choking on its own success. This then poses the problem for participant firms how to revive the cluster and how to avoid various kinds of potentially fatal lock-ins.¹² Similarly, technological innovation or an external shock such as an increase in competition induced by trade liberalisation may threaten the viability of a cluster unless its firms understand, and react to, the change in relative prices caused by either event.

OECD governments generally view clusters positively, especially those that are highly innovative, and have created support structures aimed at catalyzing knowledge exchange between key cluster actors.¹³ But with the exception of dedicated science parks, networking in most existing clusters in advanced economies emerged more or less spontaneously. This is less common in developing countries. Firms shy away from the high transaction costs associated with identifying suitable partners, especially when supply relations are weak; suffer from market imperfections with respect to the provision of information and innovation without which clusters are unlikely to prosper; rarely benefit from effective sector organisations while having to put up with profuse lobbying activity; struggle with all kinds of decrepit infrastructure; and do not have the means to police free riding in the context of a relatively underdeveloped legal framework.¹⁴

This brings to the fore external agents that reduce the weight of these factors and catalyze inter-firm communication. They include specialised business services that provide market research as well as intelligence on regulatory regimes, standards, product testing, and the like. They also include government agencies – insofar as they are technically capable and not principally intent on rent-seeking themselves – from local to regional and national level. In view of the role of governments, the interesting question is perhaps not so much how they can influence the creation of clusters as which policies promote cluster development. For example, public authorities might be able to address cluster deficiencies – in terms of providing physical or knowledge infrastructure or attracting key technologies through inward direct investment – that participant firms by themselves cannot solve.

While it is possible, in theory, to direct development policy to clusters so that firms capture externalities that would otherwise not be available, the reality of policymaking is much messier. One-size-fits-all approaches do not work. Successful interventions presume a thorough understanding of the nature of the benefits that emanate from specific instances of co-location; how these benefits can be married to equally idiosyncratic location-specific advantages; and which policy measures are best suited to making the match happen.¹⁵

So the answer to the question posed at the beginning of this section is that we recognise a cluster because the agglomeration of firms it represents exhibits at some point in time a strength that would be unattainable by the same firms in dispersion. This strength is due to agglomeration economies and to joint action, namely the concerted efforts of cluster participants to translate market opportunities and challenges into competitive potential by leveraging inter-firm cooperation. In the context of developing countries, this may require the involvement of public authorities or dedicated service providers to overcome market imperfections. While cluster is a geographically bounded concept, its knowledge infrastructure may well be open to information from beyond its boundaries. This underlines the potential significance of outside technology, especially in the context of global supply chains. Finally, clusters are a path-dependent phenomenon. How a cluster fares today has to do with its evolution over time and also bears some relevance for how it is going to perform in the future. Weak clusters may gain in strength, and clusters once successful may eventually fail. Fortunately, this chapter is inspired by a story that belongs in the former category.

FROM IMPORT SUBSTITUTION TO GLOBAL VALUE CHAINS: THE AUTOMOTIVE INDUSTRY IN KWAZULU-NATAL

The principal purpose of this section is to describe *what* happened, rather than *why*. A considerable body of work on clusters is guilty of giving extremely detailed accounts of specific instances of agglomeration without showing the relative weight of the multitude of variables employed to explain their growth. Description subsequently substitutes for analysis and stands in the way of theoretical understanding instead of helping to advance it. The historical account that follows is uncontroversial. But our contention that the elevation of a mere agglomeration to a vibrant cluster was critically

due to joint action, may well not be. That is why we construct this argument more carefully in Section 4.

This section outlines the evolution of the South African automobile sector with particular emphasis on the policy environment. It shows how the rapidly changing competitive environment since the early 1990s impacted on automotive supplier firms based in the KwaZulu-Natal Province (KZN). It examines how these firms adjusted to the changes which provides the context for the formation of the Durban Automotive Cluster.

The South African automobile-related sector is relatively insignificant compared to total global automotive production but it has for many decades captured the attention of policy makers in the country.¹⁶ In this context South Africa made considerable efforts in the post-World-War-II era, through a variety of government interventions, to create the conditions for the development of a solid automobile manufacturing presence. The involvement of state entities in concessional financing regimes, the presence of subsidised state enterprises in the defence industry, the imposition of import quotas and tariffs, and the repression of labour unions all played their part in the development of a sector that supplied, almost exclusively and in a highly protected manner, the domestic market. This policy regime was part of an industrial development framework based on import substitution that was central to apartheid-era economic policy.¹⁷ It was reinforced in the last quarter of the twentieth century as the apartheid regime began to suffer the effects of international isolation and sanctions and reacted with a growing obsession with national self-sufficiency in strategic market areas.¹⁸

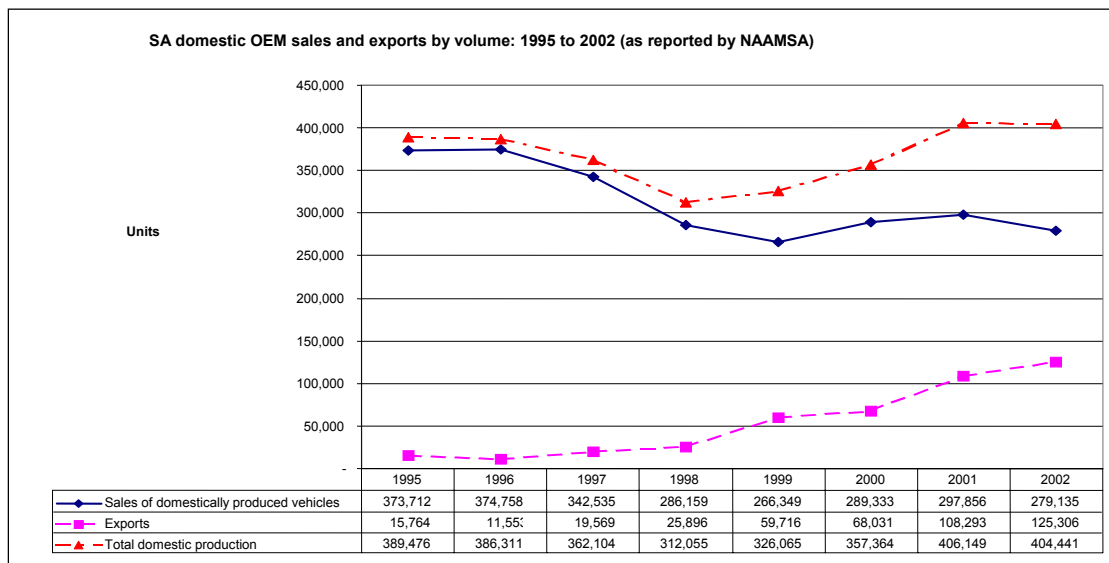
Automotive (and other) firms operated at levels of productivity, quality and innovation well below international best practice.¹⁹ For a relatively small passenger and commercial vehicle market there was a proliferation of domestically manufactured model varieties, produced and sold at costs well above those in more liberalised markets. In this sense South Africa up until the early 1990s resembled the Mexico of the 1970s. Component firms supplying into this market were characterised by low volumes and short-run production cycles. It is no wonder then that benchmarking exercises showed them to be some way off both competitive pricing and international operational standards.²⁰

The political changes of the early 1990s also heralded a new era of economic policies. In line with multilateral orthodoxies of the time, the country

embraced an accelerated trade liberalisation programme and began systematically to remove demand-oriented industrial policies. Within a relatively short period the government abolished quotas and agreed to tariff adjustments in the Uruguay Round of GATT. Duty levels on completely built up vehicles (CBUs) fell from 115 percent in 1995 to 40 percent in 2002 and are scheduled to reach 25 percent by 2012. Tariffs on completely knocked down components (CKDs) are lower yet. However, despite an unambiguous commitment to trade liberalisation in general, the Department of Trade and Industry (DTI) also pursued a policy agenda specific to the automobile sector. It did so in an effort to manage a shift towards greater export orientation. Policy makers did not want to run the risk of deindustrialisation – with disastrous effects on export prospects – that they knew global competition had rained on more or less unsuspecting emerging markets elsewhere. In 1995 this motivation led to the Motor Industry Development Programme (MIDP).

The objective behind the initial form of the MIDP was to secure the investment commitment of the major original equipment manufacturers (OEMs) with an existing manufacturing presence in South Africa. The MIDP was largely negotiated with these key role players, and the government pursued it despite concerns from trading partners that it contravened WTO commitments. The MIDP sought to encourage the domestic-based OEMs to reduce the range of models produced domestically. To this end it allowed the OEMs to earn import credits by expanding exports of the reduced range of models with significant local content. Thanks to the so-called Import Rebate Credit Certificates (IRCCs) OEMs could thus bring in a fuller range of vehicles from other plants around the world for sale in South Africa at a reduced duty level.

Figure 1: Domestic OEM sales and exports by volume



Source: Barnes and Johnson 2004, p. 6

VW, BMW and Daimler (later DaimlerChrysler) were the first to respond by injecting significant capital into their South African operations for the production of a limited range of vehicles, the bulk of which would be destined for export markets. Responses by other OEMs were slower, in part because of more complicated ownership arrangements where international brands were being produced under license by domestic firms. But soon all major OEMs signed up. The impact of this set of arrangements on South African vehicle output and exports was significant (see Figure 1). Exports have grown substantially since 1995, and between 1998 and 2002, when early OEM investments had realised production potential, unit exports rose 383.9 percent.²¹ Import levels have also grown under the more liberal trade arrangements. Imported units made up 23.1 percent of total domestic sales in 2002 compared to 6.5 percent in 1995.

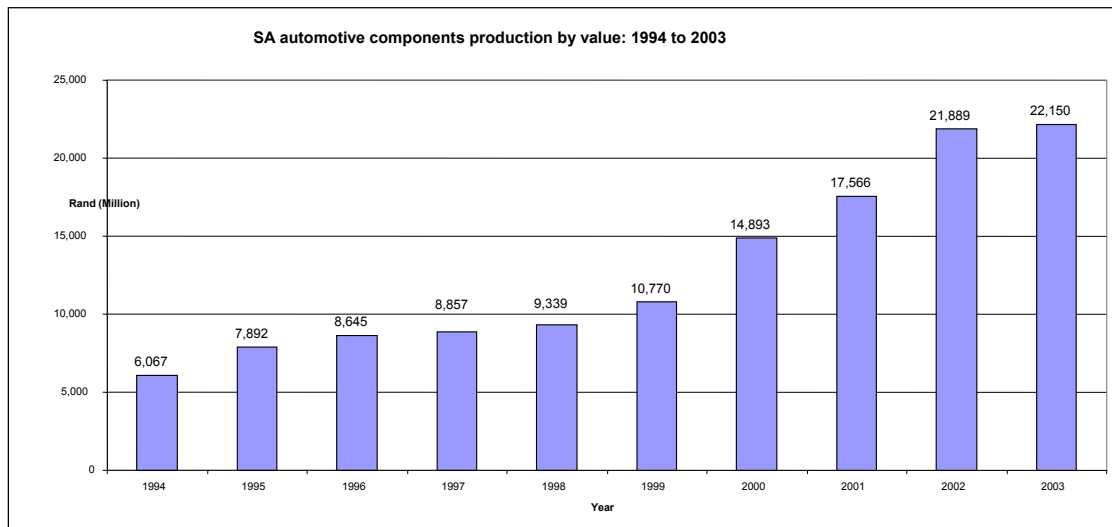
The MIDP, together with the depreciation of the Rand from the mid-1990s, turned South Africa into a relatively competitive producer of both components and completed vehicles. The contribution of the auto sector to total manufacturing sales grew from 9.7 percent in 1994 to 12.8 percent in 2003. Component sales during this period also grew from around R6 billion in 1994 to almost R15 billion in 2000. The performance of the component firms during the 1990s was largely driven by the MIDP. Prominent exports

were, for example, catalytic converters and leather seat covers. However, the growth in capacity utilisation demanded by these changes and the increasingly stringent requirements on suppliers joining global supply chains placed considerable pressure on these firms.

Local industry consolidated and subsidiaries of multinational component manufacturers entered the country. Stagnant domestic demand exacerbated the competitive pressure. Insofar as the initial design of the MIDP focused on the OEMs, the policy environment was less conducive to facilitating the adaptation of component firms. But subsequent adjustments to the MIDP addressed this shortcoming to avoid a hollowing out of the manufacturing base in which South Africa would merely be an assembly location. Figure 2 shows that the rate of growth of component output increased after 1999.

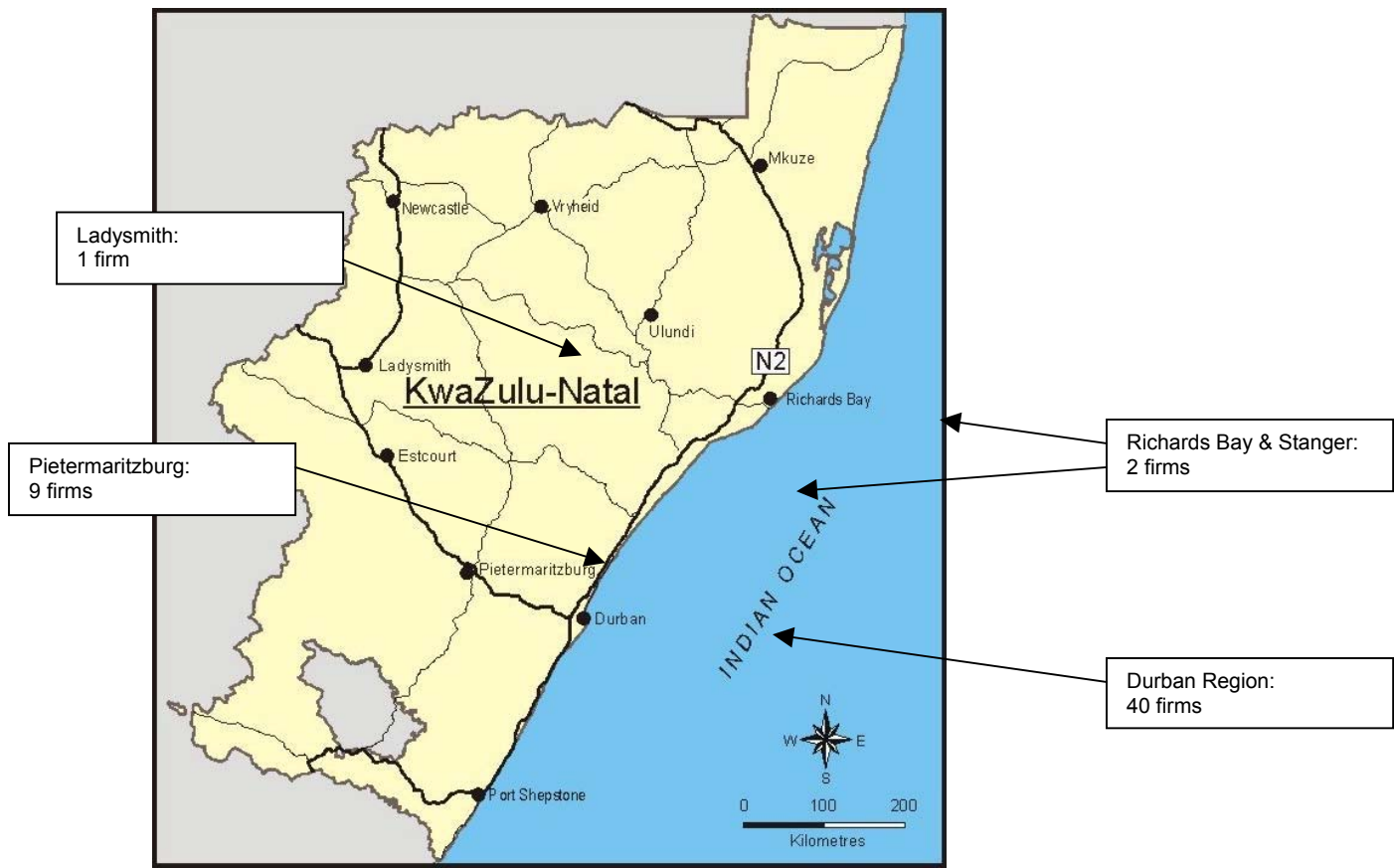
The overall impact of these policies was in line with expectations. Production for export of vehicles has increased considerably since the late 1990s, and global OEMs expanded investments in their SA-based plants. However, the period has also witnessed much greater import penetration, with firms taking advantage of the possibility to exchange credits earned from exports with local content for imported models and components.

Figure 2: South African automotive component output by value



Source: Barnes and Johnson 2004, p. 8

Figure 3: Distribution of automotive component firms in KZN (2004)



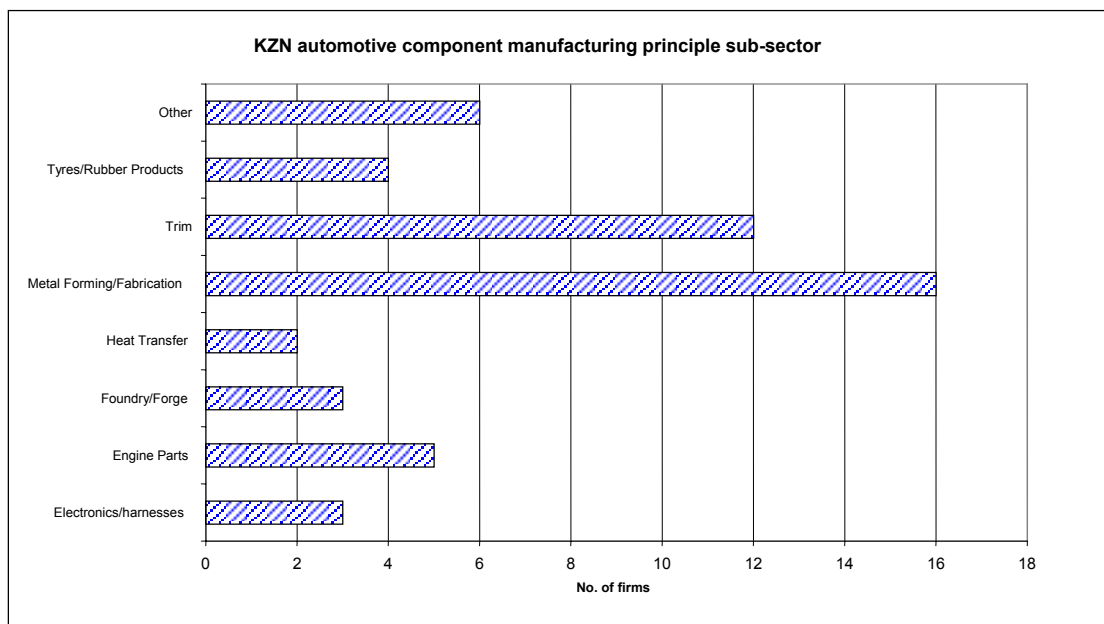
Source: Unpublished map by F. Sokolic, UKZN, B&M Analysts

It was this changing environment that confronted firms in the KwaZulu-Natal region. KZN is the country's third centre in the hierarchy of automotive sector activity (see Figure 3). The Gauteng area around Pretoria and Johannesburg is both the largest market and has the largest concentration of OEMs (BMW, Ford, Nissan, Fiat) and component firms. The Eastern Cape, with its three major OEMs (DaimlerChrysler in East London, VW in Port Elizabeth, and Delta Motor Corporation in Uitenhage) is the next most significant car manufacturing centre. Production activity in KZN is dominated by the Toyota plant which had for many years been the operation with the most significant domestic output. Although many component firms also supplied other OEMs in the country, traditionally Toyota was their most important customer. The Toyota plant used a mixture of first tier supplies from in-house operations and local component firms, and imported the rest.

Most automotive firms based in KZN, including Toyota, are based in or around Durban. Pietermaritzburg, the provincial capital, hosts the second

most numerous contingent. These firms are closely integrated with supply and logistics activities in Durban some 90 km away. The firms in Ladysmith, Stanger, and Richards Bay rely less or not at all on sourcing arrangements generated in Durban directly or indirectly by Toyota. Ten firms in KZN are first tier suppliers, 20 are second or third tier, ten supply the aftermarket, and a dozen more marginal firms straddle the latter categories (ibid, 15). Figure 4 shows their product profile. Some second and third tier suppliers are not exclusive auto component firms and produce for other sectors but count the auto sector as a significant customer.

Figure 4: Profile of KZN component producers by product type



Source: Barnes and Johnson 2004, p. 16

The performance of these firms during the period of adjustment has been highly uneven. Toyota, which until early 2002 operated in South Africa under licence from Toyota Manufacturing Corporation of Japan, initially failed to respond to the changing trade environment fostered by the MIDP. License conditions imposed major limits on exporting and the firm continued to focus on producing a range of vehicles for the domestic market. However, in view of contracting global markets Toyota Japan sought more competitive platforms worldwide, and the attractive package on offer through the MIDP led it to take a majority stake in the Durban-based operations. The plants in KZN subsequently moved rapidly toward greater

specialisation in production and improving performance levels in order to secure export contracts into Toyota's global supply system. At present Toyota exports the Toyota RunX to Australasia and is in the process of meeting requirements to export new generation Corolla and Hilux models to a range of markets, most notably the European Union. Toyota has also managed to retain a quarter of the domestic market which makes it the dominant assembler in South Africa.

The impact of this new strategic orientation was very significant for many local Toyota suppliers. Delivery specifications became more onerous and relationships in the supply network had to move to approved systems. The price for non-compliance was the prospect of losing local Toyota business to other global suppliers. Some firms struggled to adjust, while others were willingly or unwillingly drawn into becoming local plants of multinational component firms. A number of firms that either did not supply Toyota or had Toyota as only one of a number of OEM customers faced a barrage of adjustment requirements to specialise, increase volumes of output and improve product and process standards. A few new entrants also appeared in response to the new policy environment. These included manufacturers of catalytic converters, seat cover manufacturers and electronics assemblers.

Although most firms survived these changes, more than a handful admit to doing so by the barest of margins. The combined pressures that impacted on them, in a limited period of time, generated almost continual upheaval. It was in this context that studies first examined the gaps between the firms' performance standards and what was to be expected of them in the future. Researchers from the Institute of Development Studies at the University of Sussex and the School of Development Studies at the then University of Natal (today the University of KwaZulu-Natal) investigated endogenous factors that affected the competitiveness of firms, using performance benchmarking techniques. With a combination of provincial government and international donor funding – notably from the UK's Department for International Development – the KwaZulu-Natal Industrial Restructuring Project (KZN IRP) initiated detailed benchmarks in sectors active in the region, including the automotive components sector, furniture, clothing and textiles. The results of the studies were presented to managers in a series of participatory workshops. A number of automotive components producers showed considerable interest. In response the research team and the firms made a series of applications to DTI's new supply-side funds for financial

support to sustain the benchmarking work and expand the activities of the researchers into more active facilitation.

In January 1998 the KwaZulu-Natal Benchmarking Club was formally constituted with participation from eleven automotive component firms, Toyota SA, and facilitators from the KZN IRP. The Club had as its focus the following activities which each member would be entitled to draw on:

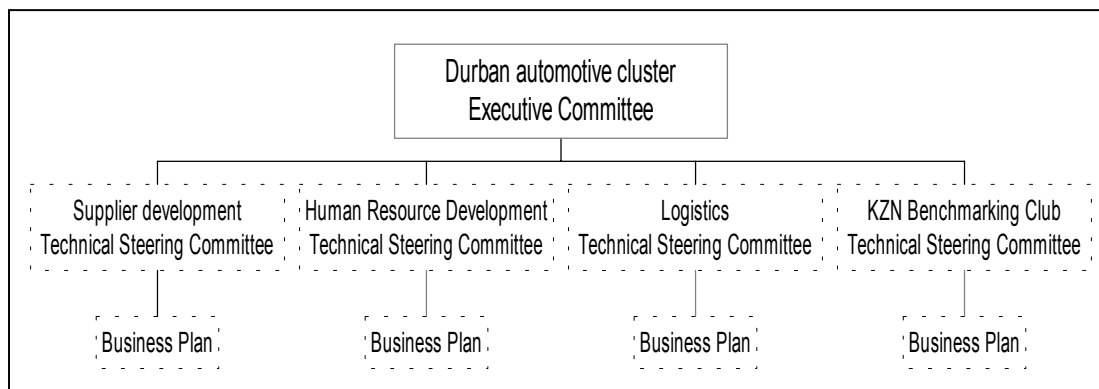
- confidential scheduled diagnostic reports of firm operational performance and customer and supplier perceptions;
- confidential benchmarks against a similar international competitor;
- monthly newsletters outlining aggregated benchmark findings;
- quarterly workshops to examine generic issues and tackle specific problems;
- sharing of information between the participants.

Research reports that resulted from the project attracted attention from the metropolitan government of the Durban region. Problems of long lead times with DTI funding mechanisms and unwieldy bureaucratic application processes encouraged the KZN Benchmarking Club facilitators to explore links with local government officials. In 1999 the then Durban Metropolitan Council's Economic Development Department, motivated by a series of independent research reports it had commissioned into cluster potentials within the automotive, chemicals and textiles sectors, agreed to provide seed funding towards an investigation into the potential of broadening participation by auto sector firms in cooperative processes. The company that had by then been formed to carry out the facilitation and research functions related to the KZN Benchmarking Club, explored the potential of expanding both the participation and the agenda of the Club. A series of workshops with KZN-based automotive components and OEM firms confirmed interest from over twenty firms in participating in information sharing and joint action activities. An additional funding commitment from the Durban Metropolitan Council enabled the Deputy Mayor formally to launch the DAC in 2002.

The DAC differed in a number of ways from the KZN Benchmarking Club. The Club's main activity was confidentially to benchmark each member firm against domestic and international competitors once a year. The Club also shared information of how member firms responded to the key

challenges arising from the benchmarks. This required a considerable commitment of time and resources on the part of the firms, and – insofar as they revealed sensitive information – could obviously only function with a high degree of trust amongst them. What the Club did not do was to focus on identifying competitive challenges facing its firms, let alone organise a collective response to them. By contrast, the DAC did both. Similarly to the Benchmarking Club, it organised for its members to share information. But this was no longer merely horizontal. Instead it explored opportunities for vertical cooperation and set up institutional arrangements to involve firms from various tiers of the supply chain who despite differences in size, experience, international exposure, and strategic orientation shared an interest in a functioning and growing local supplier infrastructure. Membership in the DAC was open to any automotive firm in KZN. Many DAC members also belong to the Benchmarking Club. The DAC’s operational structure is depicted Figure 5.

Figure 5: Operational structure of the DAC



Each DAC programme is governed by a nominated Technical Steering Committee (TSC) to ensure the successful implementation of the business plans. Each TSC comprises senior managers from DAC participants, interested government officials and a facilitator from the cluster’s service provider. The four TSCs are in turn directly answerable to a DAC Executive comprising the four chairs of the Technical Steering Committees, three further automotive component manufacturer representatives including from an SME and a PDI- (previously disadvantaged individual) owned firm, a representative of each government tier providing DAC funding, a representative of Toyota SA and two senior facilitators from the service provider.

Crucial to the early funding of the DAC was an agreement with officials from the local government that a firm-driven governance structure was essential to secure the confidence of the participants and the sustainability of the initiative. Early participants voiced reservations related to their experiences with impractical national level cluster initiatives driven by government officials in conjunction with industry associations (who reportedly delighted in scheduling frequent meetings in Johannesburg at such inopportune times that no one from out of town could attend). These initiatives typically professed little interest in micro-level or shop-floor operations that firms often felt needed priority attention. While both local government and provincial counterparts expressed a desire for the DAC to take on matters such as black economic empowerment and investment attraction, initial funding was not made conditional on these objectives. The DAC Executive was in a relatively strong position in such discussions thanks to increasingly sourcing its own funding directly from participating firms and because early successes in its activities improved its credibility as a sound partner. Presently the DAC, having diversified its income sources and nurtured the maturing of its programmes areas, has begun cautiously to move beyond its initial focus points onto partnering with government on strategic initiatives such as facilitating the entrance of black owned components firms into the sector.

It is worthwhile to reflect on the roles of the specific players that led to the formation of the DAC. The DAC was not a creation of direct and orchestrated government intervention as was the case elsewhere (for example the Eastern Cape Auto Cluster which was formed out of DTI national cluster initiatives in 1997/98). However, it would also be incorrect to describe the DAC as a pure 'bottom-up' creation of the firms that had originally participated in the formation of the KZN Benchmarking Club. Prior to the formation of the Club, most firms would have been rather sceptical about the benefits of interacting with either government or academic audiences. However, the role played by the researchers in the formation of the DAC ensured that contact with government – in the form of the DTI – was mediated. Hence government appeared a benign, if perhaps at times frustratingly quirky, partner. The research team, acting as facilitator, ensured that the more messy aspects of the interaction with the DTI did not impact on the day-to-day operating of the Club. It was aided in this process by the nature of the funding mechanism which left the recipients relatively free to allocate resources where they felt they would be most usefully spent.

The Club experience for the firms therefore left them more open to future engagement with government than they might have been had government officials got carried away with asserting their own agendas of what *they* believed were priorities for sustainable firm growth.

With regard to the formation of the DAC, the Benchmarking Club facilitators and participating firms had been discussing for some time the possibility of involving additional firms and extending their activities. Their cautious response to local government requests for a future partnership showed that they felt in a position carefully to consider the merits of any proposal and were not solely reliant on sourcing lucrative government grants for their survival. While local government, and to a lesser degree its provincial counterparts, saw an opportunity to invest in a process that was already showing returns – and therefore had a good chance of future success – the firms saw an opportunity to reduce their risks in expanding their level of cooperation without the added threat of becoming dependent of, often fickle, government attention and support.

It is also worth noting that Toyota generally took a keen interest in the workings and activities of the Cluster but has been very careful not to dominate processes. A member of its management team has been involved in the governance structure at the request of the other DAC members, but it recognised that it must not treat the DAC as its fiefdom. Many DAC members supply other OEMs, but with Toyota as a dominant regional customer they have been cautious not to rely too heavily for funding or operational support on the assembler. In this regard the DAC is an entity focused on component firms, whereas the cluster process in the Eastern Cape was for a long time dominated by OEMs seeking to improve relationships with their suppliers. Toyota participants in DAC processes have indicated that the projected growth in unit exports from the Durban plant (which will almost double output from 100 000 annually to over 180 000) will require ongoing and perhaps more intensive relationships between the OEM and the DAC as time progresses.

In the South African context, and perhaps on the continent more generally, the formation of DAC was unique. It is clear that from its origins in the early meetings where a handful of firms considered research of a half dozen academics there has been early and sustained ‘buy-in’ by the participating firms to the notion of networking and sharing information for individual and collective benefit. In its initial form as the KZN Benchmarking Club (which

continues to operate as a programme within the DAC) firms essentially managed a self-governed process. Increasing firm contributions have reinforced the notion of a process that firms feel they are able to direct to meet their own needs. Such self-reliance, combined with demonstrated success, has enabled the firms to negotiate the terms of funding from various government entities. In sum, the DAC and the BC have placed the concerns of the components sector at the heart of their activities instead of seeking primarily to serve the interests of the OEMs.

The DAC process is also noteworthy for the role of its facilitators. The academic team and later the service company spun out of the academic research programme were always a neutral provider of information and facilitation services – the service provider has not engaged itself as a consultancy providing strategic or other advice to firms, other than benchmarks and information on sector dynamics. This enabled it to play the role of a trusted agent without having its agenda clouded by providing or needing to market specific services. Firms were thus more than usually willing to share information and insights. This arrangement has also kept overheads to a minimum for the DAC; firms are not expected to cover the costs of a large consulting operation or invest in elaborate value adding business development services as part of the deal. This has enabled broader participation, especially from smaller firms.

Finally, government played a significant role. Although this has not always translated into direct participation, consistent funding with limited conditions has enabled the DAC to continue to expand its activities and involve more marginal firms. The recognition by municipal authorities that funding with excessively onerous conditions would limit the ability of firms to give direction to the process and compromise flexibility was an important element in the total funding-operational dynamic. By focusing on outcomes such as employment creation, output and export growth and improved sustainability of firms, especially emerging black-owned enterprises, in its funding mandates the municipality enabled the DAC to establish its own path to work towards the outcomes. A similar sensitivity to the stresses and strains and trust issues involved in formalising a network into an action-oriented collective has not always been apparent from other spheres of government. Reduced reliance on such sources for funding was clearly beneficial.

In sum, an existing spatial agglomeration in which buyers and suppliers interacted and made use of the labour pool around the city of Durban but which historically did not exhibit the sort of strong externalities normally associated with successful clusters, gave rise to the benchmarking and then the DAC initiative. Since membership was open to any automotive firms in KZN regardless of their distance to Durban, the cluster was inclusive or, put differently, did not impose a locational requirement. In practice, it looks like a spatial agglomeration with a couple of relatively distant subscribers whose activities relate at least in part to the supply relationships in the core of the cluster in Durban. Neither the Benchmarking Club nor the DAC evolved spontaneously or even primarily as an initiative by concerned firms. Instead, the principal protagonists were associated with the municipal government and a local university. Hence, in the face of its peculiar evolution and its partially dispersed structure, the preliminary empirical answer to the theoretical question posed at the beginning of Section 2 – *How do you know a cluster when you see one?* – is that in this case its member firms chose to call themselves just that. This turns attention to the question of the degree to which this self-styled cluster generates activities that allow it to improve collective performance.

CLUSTER PERFORMANCE AND INTER-FIRM COOPERATION

Our contention is that joint action made a noticeable difference to the performance of those automotive suppliers in KZN that joined the DAC and its forerunner, the Benchmarking Club. Put differently, while the longstanding agglomeration of firms in KZN is likely to have given rise to externalities even prior to the formation of the Club and the DAC, they cannot account for the improvement in firm performance since the latter part of the 1990s. By contrast, joint action can.

In short, this section

- shows the improvement in operational competitiveness over time. Data are taken from the database of the Benchmarking Club. The Club evaluates members once a year against international competitors in both advanced and latecomer countries. This allows to gauge performance relatively as well as absolutely
- makes a plausible (but refutable) case that joint action is an important element behind this performance. *Ceteris paribus*, more inter-firm cooperation should yield better results. The challenge is to operationalise this

- tests this contention through a survey of DAC members. Many other factors may be responsible, individually or jointly, for the generally positive performance of the DAC. Notably this would include increased international competition and other forms of inter- or intra-firm cooperation, for example between license partners or subsidiaries and multinational principals.

PERFORMANCE IMPROVEMENT IN DAC

It is easy to demonstrate that member firms have become better in a range of activities. Indeed, firm level data confirm that operationally much has been happening since the late 1990s (see Table 1).

Table 1: Average competitiveness improvements recorded at Benchmarking Club members

Indicator	Unit	1999	2002	Improvement (%)
Total inventory holding	Days	51.14	40.19	21.41
Customer return rate	Ppm	4,269	1,034	75.78
On time & in full delivery	%	91.73	92.17	0.48
Absenteeism	%	4.20	3.59	14.52

Source: KZN/Eastern Cape/Gauteng Benchmarking Club database

Note: Total inventory holdings = ratio of operating days over stock turns per annum; customer return rate = parts per million units of production delivered to customers returned due to defects; on time and full delivery = percentage of total deliveries supplied to customers on time and in full; absenteeism = percentage of man days lost due to employees not being at work except for holiday leave.

The information comprises competitiveness and financial performance data from over 40 automotive component manufacturers, including DAC members, which belong to one of three regional Benchmarking Clubs in KwaZulu-Natal, Eastern Cape and Gauteng provinces. In 2002, their employment ranged from under 50 to over 2000, and turnover from Rand 11 million (USD 1 million) to Rand 1.1 billion (USD 11.6 million). They represent roughly 25 percent of the national automotive components industry by value.

Each member is benchmarked against an international competitor based in either Western or Eastern Europe, Malaysia or Australia. Thus the database

includes information from a set of international firms that broadly match the product profile of their South African counterparts (see Table 2). South African based firms generally lag behind their competitors. Only the top performers match and indeed outperform their international peers.

Table 2: Relative performance of Benchmarking Club members

Indicator	Club member average	Club member upper quartile	Developing/ transition economy average	Developed economy average
Total inventory holding	40.19	23.00	32.81	37.30
Customer return rate	1,034	23	529.71	785.22
On time & in full delivery	92.17	98.00	96.38	91.91
Absenteeism	3.59	2.00	4.35	5.67

Source: KZN/Eastern Cape/Gauteng Benchmarking Club database

THE GAINS FROM JOINT ACTION: A PLAUSIBLE BUT REFUTABLE CASE

The indicators in Tables 1 and 2 measure how successfully DAC and other Benchmarking Club firms implement lean management practices.²² They do not show what the improvement results from. One possibility is joint action. The DAC runs programmes in the areas of supplier development, human resource development, logistics, and benchmarking to advance these practices. Committees staffed by managers of member firms, supported by facilitators from the service provider, regularly meet in order to identify problems, discuss how to address them, disseminate their deliberations, and ultimately come up with a solution. These are incidences of cooperation. In other words, the firms engage in joint action.

In an attempt to systematise this notion we separated it into two components, commitment and frequency. Regarding the former, it would be different for managers merely to attend a workshop and (passively) absorb information as opposed to actively seek and provide data to share with their peers. Low commitment by a firm means that it underwrites the (partial) cost of an activity but devotes no management time to it. For example, in the DAC's

case the service provider surveys trends in the world car industry and summarises their implications for the regional automotive economy. This intelligence is distributed regularly to member firms. It creates awareness and potentially informs their strategic thinking, but firms have no direct input. High commitment means the investment of comprehensive management time across functions, such as the participation of senior staff in specialised work groups (e.g. on purchasing skills) that report to a technical steering committee which oversees the supplier development programme within the cluster. Frequency concerns how often activities or meetings take place. This goes from low (once in 5 months to once a year) to medium (once every 2-4 months) to high (more than once a month).

In Table 3 these two parameters are combined into a composite cooperation index. The index weighs commitment more heavily than frequency. This is because a high-commitment exercise that happens once a year is worth more than a largely passive exercise that happens once a month. The expectation is that a relatively high-value joint action would lead to more solid gains. The last column in Table 3 illustrates that this is indeed generally the case. For example, in the area of supplier development, a high-powered Technical Steering Committee with a busy meeting schedule, assisted by a specialised work group, identified purchasing skills as a key weakness and ultimately succeeded to institute a dedicated course aimed at training the requisite skills at the local technical university. Likewise, joint action with a low cooperation score – as pretty much all activities in the DAC's Logistics Programme – did yield a very tangible result, namely reduced shipping rates for DAC members, but this was a smaller feat than re-organising the training programme in a school. Hence across the four cluster programmes it appears that a higher incidence of cooperation leads to more impressive results – it is plausible that joint action matters. But the case is not solid yet.

Table 3. Joint action in the DAC: incidence and gains

INCIDENCE OF COOPERATION		CCI	GAINS
Commitment (a)	Frequency (b)		
Supplier development			
Dissemination of locally relevant global industry trends [LC]	HOW OFTEN? [MF]	1.19	<ul style="list-style-type: none"> ▪ Launch of automotive purchasing course at Durban Institute of Technology (DIT) (with 18 enrolled students in first year) ▪ Launch of PDI supplier development programme with KZN Manufacturing Advisory Centre (with 6 firms in first run) ▪ Launch of web-based, globally marketed supplier database
Workshops on topical supplier development issues [MC]	Once every 5 weeks [HF]	2.38	
Technical Steering Committee of supplier development business plan [HC]	Once every 6 weeks [HF]	4.00	
Specialised workgroups (purchasing skills, supplier development best practices, vertical information sharing, PDI/BEE) [HC]	> once every 6 weeks [HF]	4.00	
Special interest groups (inventory and quality mgmt) [HC]	up to fortnightly [HF]	4.00	
Human resource development			
Workshops on information sharing and capacity building [MC]	Once every 8 weeks [MF]	2.00	<ul style="list-style-type: none"> ▪ Launch of in-service training programme with DIT and Mangosuthu Technikon (with 20 enrolled students in first run)
Investigation of joint training opportunities [MC]	once a month [HF]	2.38	
Logistics			

Dissemination of logistics benchmarking survey [LC]	Annual [LF]	1.00	
Survey of road freight movements in and out of cluster [MC]	Once [LF]	1.66	<ul style="list-style-type: none"> ▪ Negotiation of joint in- and outbound shipping and airfreight rates
Workshops on information sharing [variable]	Semiannual [LF]	1.00-2.88	
Dissemination of Benchmarking Club newsletters [MC]	Monthly [HF]	2.88	<ul style="list-style-type: none"> ▪ Improvement in avg. operational competitiveness
Workshops on HRD, change mgmt, FX mgmt, product development [MC]	Once every 4 months [MF]	2.00	<ul style="list-style-type: none"> ▪ Increase in profitability, sales, employment
<p>Note:</p> <ul style="list-style-type: none"> ▪ CCI = composite cooperation index. The formula used is $c = 2^{\alpha f + (1-\alpha)}$. The weight α is set equal to 0.75. This is somewhat arbitrary but reflects the greater importance of commitment relative to intensity. Choosing 0.66, for example, would yield similar values, only less dispersed. The nice feature of this exponential function is that the minimum possible value is 1, the maximum 4, hence making for easy comparisons. ▪ LC, MC, HC = low, medium, and high commitment <ul style="list-style-type: none"> ◦ LC = firm only underwrites (partial) cost of activity (=0) ◦ MC = firm dedicates select mgmt time to activity (=1) ◦ HC = firm dedicates comprehensive mgmt time across functions and layers to activity (=2) ▪ LF, MF, HF = low, medium, high frequency <ul style="list-style-type: none"> ◦ LF = once every 5-12 months (=0) ◦ MF = once every 2-4 months (=1) ◦ HF = more than once every 2 months (=2) ▪ PDI = previously disadvantaged individuals <p>BEE = black economic empowerment</p>			
Investigation of joint training opportunities [MC]	once a month [HF]	2.88	<p>recognition (with 20 endorsed students in first run)</p>

Logistics

JOINT ACTION, COMPETITION, AND NON-CO-LOCATED INTER-FIRM COOPERATION

Schmitz and his team based their work on collective efficiency on the proposition that shocks like trade liberalisation would catalyze joint action.²³ Consequently they looked at whether or not the exchange of information and experiences, cooperation in improving quality and in speeding up delivery and so forth increased in the wake of an external shock. The present paper is clearly in the tradition of Schmitz's work. But in our case the link between trade liberalisation and inter-firm cooperation is obvious, as is the increase in the latter. Our question is if this increase has made a difference in terms of improving cluster performance. More formally, was the DAC instrumental in the acquisition, assimilation, adaptation and exploitation of information?

Of course, the answer could be negative. Increased competition might have motivated firms to become more efficient. In this case the market matters most, externalities some, but joint action little to nothing. Likewise, inter-firm cooperation may well be important but in a different sense, namely between license partners. In addition, knowledge transfer that ultimately manifests itself in more capable local adoption of lean management techniques may be primarily intra-firm, especially from foreign MNCs to their subsidiaries. Of course, global competition on the one hand and DAC activities on the other are different types of variables. Competition is the driver that propels firms to undertake (or not) some form of adjustment, and cluster activities are its manifestations. Joint action is unlikely in the absence of increased competition because there is no challenge to meet that would justify the required commitment of resources. At the same time, however, a firm can adjust primarily because of increased competition – and because it can draw on internal resources that allow it to do so even in the absence of joint action – or primarily because, given this competition, it can draw on collective resources. Note that especially smaller and under-resourced firms may not even be aware of more dynamic aspects of competition that affect them in the medium more so than in the short run, unless an external agency explains market trends to them. For this reason it makes sense to compare the relative weight of the rather different factors influencing firm adjustment.

We explored the relative weight of these different variables in a survey of the managers of the DAC member firms (see questionnaire in Appendix).

The questionnaire enquires about the importance of intelligence member firms receive from the business service provider, the gains they get from participating in DAC workshops, and if members would be able to substitute these services if the DAC did not exist (Questions 1-7). Question 8 asks about the relative import of a number of variables that individually or collectively could conceivably influence the performance of individual firms. 19 of 26 targeted member firms responded.²⁴

The results are revealing (see Table 4). On average a minimum of one in three managers attaches a high value to the acquisition and assimilation (Questions 1, 3, 4) and to the exploitation (Question 2) of knowledge made possible by DAC activities, and practically the entire respondent group assigns this at least medium significance. Interestingly, fewer managers benefit strategically from workshops (Question 5) than from surveys. In other words, external knowledge is possibly more important to dealing with the challenges of global supply chains than intra-cluster intelligence. The efficiency of joint action is not in doubt; more than nine out of ten respondents report that substituting cluster activities would be expensive or not an option at all (Question 6). Likewise, the same number of respondents are convinced of the effectiveness of cluster activities in generating performance improvements (Question 7).

Table 4. Survey results (Questions 1-7): significance of learning (%)

Question/importance	Low	Medium	High
1. importance of intelligence by DAC service provider for own understanding of global auto industry	0	68	32
2. importance of intelligence by DAC service provider for strategy	5	53	42
3. importance of DAC workshops for understanding global best practices	0	47	53
4. importance of DAC workshops for understanding cluster dynamics	5	42	53
5. importance of DAC workshops for strategy	5	74	21
6. ease of substitutability of DAC workshops	37	58	5
7. importance of DAC activities for improvement of operational competitiveness	10	16	74

Note: For Question 7, low = only own competitiveness; medium = only that of other DAC members; high = both.

The latter point can be disaggregated further (see Table 5). The single most important factor for achieving internationally required performance standards is global competition. This underlines the essential role of the

DAC in facilitating learning about global competition reported above. In other words, inter-firm competition in global supply chains exerts pressure on firms within the cluster; and the cluster helps its members understand the nature of this challenge. A key factor for the ‘hard’ performance criteria of quality and cost is technical assistance from foreign partners; this includes licensors as well as multinational investors. It is in these two areas that South African firms are most burdened by the legacy of import substitution and where their competence was most in question. It appears that DAC activities, the joint second and third most important factor, respectively, helped them rise to the challenge.

*Table 5: Survey results (Question 8):
Determinants of required performance levels (mean)*

	Quality	Cost	Flexibility	Delivery
DAC activities	4.6	4.4	4.8	4.6
Competition from DAC members	3.7	3.3	3.7	3.5
Competition from non-DAC suppliers in KZN	2.8	2.7	2.9	3.0
Competition from suppliers elsewhere in SA	3.5	3.9	3.7	4.1
Competition from suppliers outside SA	5.4	5.5	4.9	4.9
Technical assistance from foreign partners	4.6	4.7	3.6	3.5
Consultants	3.1	2.8	2.8	2.7

Note: 1 = least important; 7 = most important.

The situation is somewhat different with respect to the two ‘soft’ criteria of flexibility and delivery. In these areas cluster activities are almost as important as global competition while technical assistance, on average, is not particularly important at all. Table 3 showed that on-time and full delivery, especially of the Club's top performers, was on par with international standards. And South African firms had always had to employ flexibility to compensate for the cost disadvantages associated with small production runs. The managers' responses suggest that joint action has been instrumental in turning these ‘make-do’ attitudes into internationally acceptable competences. Small and PDI-owned firms evaluate the importance of joint action more positively than larger firms. On balance small firms say that the DAC is essential while larger firms consider it merely useful.

The information in Table 5 also shows that inside the cluster cooperation is more important than competition. This will be music in the ears of cluster aficionados. By contrast, competition is more important than inter- or intra-firm cooperation outside the cluster. This raises the question about the relative significance of alliance capitalism in developing countries or, more specifically, the extent to which individual subsidiaries act as conduits for knowledge that lends itself to technological upgrading of domestic firms. It would be interesting to address the nature and quality of technology-relevant extra-cluster links in future research.

CONCLUSIONS

Joint action matters for firm performance, at least in the case at hand. Joint action lowers the costs of information provision about markets, product standards, process requirements, and other variables that determine the competence with which firms confront global value chains. Joint action also helps firms gear up for what is, not just in the global automotive industry, a tough fight for a place in the sun. Cooperation-vs-competition is a meaningless dichotomy. If global competition is the challenge, local cooperation is the efficient answer for firms that would stand little chance of understanding what this competition is really about, let alone facing up to what it asks of them. This applies to all firms in the cluster, but especially so to those relatively disadvantaged by small size and lack of experience in supplying to global value chains.

The success of the DAC is due to a fortuitous combination of impartial analysis by academics-turned-consultants whose competence and motivation – unlike that of most pure-bred consultants – was beyond doubt; the realisation by firms of their own limitations along with a commitment to overcoming them; and a policy framework conducive to the strategies of multinational assemblers and component suppliers that incorporated South Africa into their worldwide production networks.

It is not easy to draw lessons from this success story for the rest of Africa. Perhaps the key insight from this experience is that firms in latecomer – and even more so in developing countries – need to learn the rules of the game before they get a realistic chance at play. Hence knowledge is key, and collective efficiencies are perhaps most effective when marshaled to provoke, promote, and verify learning.

ENDNOTES

1. Porter 1990.
2. Enright 1996; Swann and Prevezer 1998.
3. Storper 1997; for a useful survey of the relevant literature, see Baptista 1998.
4. Enright 1996.
5. Roelandt and den Hertog 1999.
6. Ceglie et al. 1999.
7. Humphrey 1995.
8. Birkinshaw 1996; Young et al. 1994; Dunning 1993.
9. Enright 2000.
10. Blomström and Kokko 1998; Lall 1993.
11. Schmitz 1999.
12. Enright 1996, 207-208; Swann and Prevezer 1998.
13. Roelandt and den Hertog 1999.
14. Ceglie et al., 1999; for examples from Africa, see also McCormick 1999.
15. Doeringer and Terkla 1996.
16. The industry comprises eight light vehicle OEMs, a number of medium and heavy commercial vehicle OEMs, and some 250 dedicated component manufacturers, many of which are MNC subsidiaries.

17. Joffe et al. 1995.
18. For an overview of policy in that period, see Black 2001.
19. Joffe et al., 1995.
20. Kaplinsky and Morris 1997.
21. Data in this section are from Barnes and Johnson 2004.
22. Not all DAC members are also members of the Benchmarking Club, and due to the relatively recent vintage of the DAC and its growing membership not all of those that are have been benchmarked twice, making it impossible to evaluate performance over time. Technically the correct procedure would have been for us to report performance indicators only for DAC firms. But this would have reduced our sample making it more vulnerable to outliers while not changing the underlying positive trend. Hence, our analysis of joint action is conservative in that it suggests that DAC firms are as least as good as Benchmarking Club members. This is not a heroic assumption. In future work and as our database expands both in terms of membership and over time, we aim to look for differences across the three provinces and, within KZN, between ordinary BC members and those that are also members of DAC.
23. Schmitz 2000.
24. In mid-2004 the DAC had more than forty member firms. We only approached those firms that have been members since the beginning of the Cluster in 2002 in order to elicit more informed responses.

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Durban Automotive Cluster

DATE

**Attention:
Managing Director**

Dear

DAC PERFORMANCE QUESTIONNAIRE FOR MEMBER FIRMS

Please find attached a short, two-page questionnaire that I would greatly appreciate you completing over the course of the next week. It is a simple questionnaire that requires the ticking of set responses and the provision of a few numbers. It should therefore not take more than 10-15 minutes to complete. Its purpose is to assess the relative significance of joint action in the performance improvement of cluster members. The Durban Automotive Cluster has been in operation now for nearly three years and as such we would value your input in relation to the benefits (or otherwise) derived. I would like to request complete honesty in relation to the completion of the questionnaire, as all findings will be aggregated and then used to analyse the performance of the DAC. I will also be using the findings to unpack some of the academic lessons that can be extracted from the various activities of the DAC. If you feel that you are not the most appropriate person to complete the questionnaire, please forward it onto the necessary individual(s).

If you have any queries pertaining to the questionnaire generally, as well as individual questions posed, please contact me directly on 082-7875608.

It would be appreciated if the questionnaire could be faxed (031-7653873) back to the DAC's offices by Wednesday, the 9th of June.

Kindest Regards

Justin Barnes
Chief Facilitator
Durban Automotive Cluster

Integrated WP41-WEB
10/5/2005



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PERFORMANCE QUESTIONNAIRE FOR MEMBER FIRMS

Company:

Name of respondent:

Position in company:

Date:

1. Do the surveys you receive from the DAC (e.g. on supplier development issues, human resource development, logistics and benchmarking) make a difference to your understanding of trends (e.g. JIT, TQM, CI) in the global automotive industry?

No, they merely confirm what we know anyway. []

Yes, they make a small difference by complementing other sources of information. []

Yes, they are our single most important source of information and make a big difference. []

2. Do the insights from these surveys inform strategic thinking in your company?

Not at all. []

A little. []

Very much. []

3. Do DAC workshops (e.g. on supplier development, HRD, logistics, general management issues, competitiveness issues) make a difference to your understanding of best practices in the global automotive industry?

Not at all. []

A little. []

Very much. []

4. Do these workshops make a difference to your understanding of problems and competencies of cluster members and/or non-DAC KZN-based automotive suppliers?

No, we had an equally good understanding of the local industry even before these workshops. []

Yes, they contribute marginally to our understanding. []

Yes, they contribute very significantly to our understanding. []

5. Do discussions in these workshops inform strategic decision-making in your company?

Not at all. []

A little. []

Very much. []

6. In the absence of these workshops, would you be able to get the same level and quality of information from other sources (such as trade magazines, internet sources, executive courses organized by business schools, foreign partners)?

No. []

Yes, but only at a higher cost. []

Yes, unconditionally. []

7. Does your participation in activities guided by one or more of the DAC's Technical Steering Committees (e.g. specialised work groups, special interest groups, advanced training courses) improve the operational competitiveness of member firms (i.e. do you learn from your peers and do they learn from you)?

It does not improve my own or that of other member firms. []

It improves my own but not that of other member firms. []

It improves that of other member firms but not my own. []

It improves both. []

8. In terms of achieving internationally required levels of quality, cost competitiveness, flexibility, and speed of delivery, please rank the importance of the following inputs (where **7 = most important** and **1 = least important**) using the entire ranking scale from 1 to 7 for each parameter:

	Quality	Cost	Flexibility	Delivery
DAC activities				
Competition from DAC members				
Competition from non-DAC suppliers based in KZN				
Competition from non-DAC suppliers based elsewhere in South Africa				

Competition from suppliers based outside SA				
Technical assistance from foreign partners				
Use of consultants				

9. How do you feel the DAC could be improved and more effectively service the local auto industry?

Thank you for completing this questionnaire. Please return it via fax (031-7653873) by Wednesday, the 9th of June 2004

• We are grateful to Peter Møllgard, Kaushalesh Lal, Mike Morris, and Lynn Mytelka for helpful suggestions.